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being more nearly intermediate between red and yellow.

The last of the 53 color plates gives two series of tones of gray, one obtained by mixing white and black on the color wheel, the other by mixing lamp black and Chinese white. Plates XXII. and XXIV. are extras, from one of several series made during the progress of the work, given because they show a number of important intermediates of the present series that are very useful. Both these plates fall in the first series of broken colors.

Every one of the 1,115 specimens of color shown on the plates is given a name. The method used in selecting these names is given in considerable detail. An excellent index of color names is given on pages 29 to 40, with references to the corresponding specimens in the plates.

Not the least valuable feature of the book is the list of definitions of color terms on pages 15 to 20. The list of dyes and pigments used in the preparation of the Maxwell disks representing the 36 colors of the fundamental series is given on pages 26 and 27. The text ends with a list of a few of the modern books on the subject which the author found most useful in his work.

It is perhaps too much to say that this monumental work is the final solution of the problem of color standards, but it is doubtful if any one so competent as Ridgway in matters relating to color will in the near future devote a very important portion of his working life to the subject as Ridgway has done. He has certainly produced a *usable* set of standards.

W. J. SPILLMAN
U. S. DEPARTMENT OF AGRICULTURE

Microbes and Toxins. By E. BURNET. Translated by C. BROQUET and W. M. SCOTT. G. P. Putnam's Sons. 1912.

When Professor Metchnikoff was asked by the publishers of the Bibliothèque de Philosophie Scientifique to prepare for that library a book on microbes and toxins he turned the task over to one of his younger colleagues, Dr. Etienne Burnet. An English translation has promptly been prepared and makes a volume of some 300 pages. There are four introductory chapters—on the carbon and nitrogen cycles, on the presence of microbes on the surfaces of the human body, on the morphology, and on the physiology of the microbes—and a concluding chapter on chemical remedies for microbic disease (sleeping sickness and syphilis). The other ten chapters forming the bulk of the book deal directly with the problems of infection and immunity.

The book is a little difficult to place. According to Professor Metchnikoff's preface it appears to be intended for general reading. "It is time," he says "for bacteriological science to leave the laboratory and the lecture theater and to take its place before the great public, in order that its benefits may receive the widest and readiest application." It takes a mature mind and a special gift, however, to produce a really popular and yet valuable book upon a technical subject. The present volume is crammed with minute details and discussion of controversial points and seems to the reviewer quite unsuited for the general public. Even for a student's text-book, there is more detail than is desirable. On the other hand, the treatment is by no means sufficiently full and complete to serve as a reliable work of reference for the advanced worker.

Its greatest value perhaps lies in the fact that it presents very fairly the position of the Pasteur Institute headed by Professor Metchnikoff; and the important part played by this school in the development of our knowledge of immunity makes such a "brief," if it may be called so, a valuable contribution to the history of bacteriology. The problems of intestinal bacteriotherapy in Chapter II., of phagocytosis in Chapters VI. and X., and of the mechanism of immunity in Chapter XI., for example, are of special interest.

The view is of course always that of Professor Metchnikoff and his associates rather than a well-rounded presentation of generally accepted opinion; and doubtful points are often dismissed with what one is tempted to

characterize as truly Gallic dogmatism. In regard to the relative importance of humoral and phagocytic factors in immunity statements of the most sweeping nature are made. So we read on page 205: "Are the opsonins substances or properties new and unknown before Wright's researches? Numerous experiments ascribe to the opsonins of normal serum the same properties as characterize the complement. They are products of the leucocytes." And again on page 227: "There are only two 'theories,' that of Ehrlich and that of Bordet, which, with their conjectures, their uncertainty, their attempts at explanation, and their continual state of incompleteness, are striving to round off the positive doctrine, the expression of undoubted facts, namely, phagocytosis." "It is no way of recognizing the capital importance of phagocytosis to admit that anti bodies and other humoral properties are produced by the phagocytes. The essential fact is the destruction of the microbes by incorporation and digestion. Extraphagocytic destruction is so much an exceptional case that it can not even be brought in as opposition."

The illustrations are for the most part crude line drawings of the type found only in French texts. The English translation is somewhat unfortunate, abounding in constructions like the following (from p. 171): "To prepare an anti-endotoxin, as in the preparation of an antitoxin, it is necessary to inject several times into an animal, for example, the horse, the toxic substance, in this case the bacterial bodies, entire or broken up"; so that the reader is almost reminded of the fate of the famous jumping frog after his translation into French and back again.

C.-E. A. Winslow

SPECIAL ARTICLES

A THIRD GROUP OF LINKED GENES IN DROSOPHILA AMPELOPHILA

The existence of a group of sex-linked genes in *Drosophila ampelophila* which are linked to each other in different degrees has been demonstrated by Morgan in numerous papers ('10, '11, '12) and by Sturtevant ('13). The fact that the black and vestigial factors, which are not sex-linked, are linked to each other, was reported by Morgan and Lynch ('12) and by Morgan ('12), and these genes were considered as lying in the "second chromosome." The present paper presents evidence showing the existence of still another group of genes, which are located in the "third chromosome."

The pink-eyed fly, first described by Morgan ('11), has been shown (Morgan, '11, '12) to behave as an ordinary Mendelian recessive to the normal red. That this factor is independent of those in the second chromosome is shown by the following experiments:

Red black ♀ × Pink gray ♂	→ red gray ♂ and ♀ →	red gray	113
		red black	52
		pink gray	47
		pink black	22
Red gray ♀ × Pink black ♂	→ red gray ♂ and ♀ →	red gray	279
		red black	96
		pink gray	107
		pink black	40
F_1 red gray ♀ from above × Pink black ♂	→	red gray	96
		red black	111
		pink gray	67
		pink black	77
Vestigial red ♀ × Long pink ♂	→ long red ♂ and ♀ →	long red	717
		long pink	268
		vestigial red	136
		vestigial pink	50